ELIZABETH AMES JONES, CHAIRMAN DAVID PORTER, COMMISSIONER BARRY T. SMITHERMAN, COMMISSIONER



LINDIL C. FOWLER, JR., GENERAL COUNSEL COLIN K. LINEBERRY, DIRECTOR HEARINGS SECTION

# RAILROAD COMMISSION OF TEXAS

### OFFICE OF GENERAL COUNSEL

OIL AND GAS DOCKET NO. 03-0272531

THE APPLICATION OF DENBURY ONSHORE LLC FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS PURSUANT TO STATEWIDE RULE 46, OYSTER BAYOU FIELD UNIT LEASE, WELL NO. 105, OYSTER BAYOU FIELD, CHAMBERS COUNTY, TEXAS

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HEARD BY: Andres J. Trevino, P.E., Technical Examiner Michael Crnich, Legal Examiner

#### APPEARANCES:

#### REPRESENTING:

Brian Sullivan Patricia Moore Ted Carriker Marie Urmin Jon Herber Ray Lewis Michael Gonzalez

Felix H Jackson Trustee

Ocie R Jackson Trust

Denbury Onshore, LLC

Larry W. Wells

Self

## **EXAMINERS' REPORT AND PROPOSAL FOR DECISION**

### PROCEDURAL HISTORY

Application Filed:
Request for Hearing:
Notice of Hearing:
Date of Hearing:
Proposal For Decision Issued:

April 8, 2011 August 25, 2011 September 29, 2011 November 15, 2011 February 2, 2012

### STATEMENT OF THE CASE

Denbury Onshore L.L.C. ("Denbury") requests to amend the existing permit under Project Number F-00195 to add two injection wells on its Oyster Bayou Unit in the Oyster Bayou Field in Chambers County, Texas. Denbury, as operator of the Oyster Bayou Field Unit, filed the applications to inject which are the subject matter of this hearing and requests the issuance of permits pursuant to Statewide Rule 46 to inject fluid into the Oyster Bayou Field Unit Well Nos. 103 and 105 in Chambers County, Texas. These permit applications are a part of Denbury's continuing development of the field for a CO<sub>2</sub> flood. Denbury has plans to operate these two wells as producers on Tract 1, but is requesting injection authority now so the wells can be converted to injection in a timely manner in the event that Denbury's CO<sub>2</sub> flood of the Oyster Bayou Field Unit is not confined by Denbury's dedicated curtain injection wells on Tract 7.

The application is protested by Larry W. Wells ("Wells"), the owner of an undivided interest in the surface of an adjacent tract within the boundaries of the Oyster Bayou Field Unit, the location of the curtain injection wells. Mr. Wells asserts that he is concerned that the issuance of the requested permits will lead to subsurface trespass, specifically that the  $CO_2$  injected by Denbury will fill up cavern space beneath the surface tract in which he owns an interest.

### **DISCUSSION OF THE EVIDENCE**

### **Applicant's Evidence**

Prior to commencement of the applicant's direct case, Mr. Felix Jackson, trustee of the Ocie R. Jackson Ranch Trust and the Jackson Family Trust, which own the surface and minerals, respectively, of Tract 1, appeared as an interested party to make a statement in support of Denbury's resurrection of the field and Denbury's application for injection authority for the subject wells. Mr. Jackson stated that he has been pleased with the company as they have been "good stewards of the land" and he urged the Commission to let Denbury "proceed with their operations" and rule in Denbury's favor.

Denbury requests authority to utilize the Oyster Bayou Field Unit Well Nos. 103 and 105 to inject water and  $\mathrm{CO}_2$  into the unitized interval of the Oyster Bayou Field Unit in order to assist in Denbury's unit-wide  $\mathrm{CO}_2$  flood. The Nos. 103 and 105 wells are permitted as regular locations within the Unit, and are intended to be completed as producing wells. Denbury requests the injection authority for these wells in order to possess the ability to convert them to injection in the event Denbury's operations show signs that the intended water curtain configuration on Tract 7 of the Oyster Bayou Field Unit (Well Nos. 701, 702, and 703) is unable to completely prevent hydrocarbons and  $\mathrm{CO}_2$  from migrating out of the unit.

The Oyster Bayou Field was discovered on April 3, 1941, and has produced nearly 143 million BO since that time. Primary production began in 1941. In 1950, water pressure maintenance was commenced, and ended in 1997. From 1976 to 1981, gas injection occurred. In 2007, Denbury acquired the producing leases and became the operator of the field.

The Oyster Bayou Field Unit (OBFU) Lease, Well No. 103 will be a newly drilled well that will be drilled to total depth of 8,800 feet. The well will have 1,200 feet of 10 ¾" surface casing cemented to surface with 700 sacks of cement. An exception to Statewide Rule 13(b)(2) was granted by the Houston District Office authorizing the setting of the surface casing at a depth of 1,200 feet, more than 200 feet deeper than the specified protection depth. The OBFU-103 will have 8,800 feet of 5 ½" or 7" casing cemented with 1,350 sacks of cement. The top of cement behind the longstring is estimated to reach a depth of 2,000 feet. The well will have perforation completions estimated from 8,300 feet to 8,450 feet. The Texas Commission on Environmental Quality recommends that usable-quality ground water be protected to 350 feet. (See attached wellbore diagram).

The proposed injection will be through 3 ½" or 2%" tubing with a packer set at 8,265 feet. The proposed injection interval is the Frio between 8,300 feet to 8,450 feet. The maximum rate of injection requested is 20,000 barrels of salt water per day and 30 MMCF of CO<sub>2</sub> per day. The daily average injection is estimated at 10,000 barrels of salt water per day and 23 MMCF of CO<sub>2</sub> per day. The maximum requested injection pressure is 4,150 psi for liquid and 6,225 psig for gas.

The Oyster Bayou Field Unit (OBFU) Lease, Well No. 105 will be a newly drilled well that will be drilled to total depth of 8,800 feet. The well will have 1,200 feet of 10 ¾" surface casing cemented to surface with 700 sacks of cement. An exception to Statewide Rule 13(b)(2) was granted by the Houston District Office authorizing the setting of the surface casing at 1,200 feet, more than 200 feet deeper than the specified protection depth. The OBFU-105 will have 8,800 feet of 5 ½" or 7" casing cemented with 1,350 sacks of cement. The top of cement behind the longstring is estimated to reach a depth of 2,000 feet. The well will have perforation completions estimated from 8,300 feet to 8,450 feet. The Texas Commission on Environmental Quality recommends that usable-quality ground water be protected to 350 feet. (See attached wellbore diagram).

The proposed injection will be through 3 ½" or 2%" tubing with a packer set at 8,265 feet. The proposed injection interval is the Frio between 8,300 feet to 8,450 feet. The maximum rate of injection requested is 20,000 barrels of salt water per day and 30 MMCF of CO<sub>2</sub> per day. The daily average injection is estimated at 10,000 barrels of salt water per day and 23 MMCF of CO<sub>2</sub> per day. The maximum requested injection pressure is 4,150 psi for liquid and 6,225 psig for gas.

There are 23 wells within a  $\frac{1}{2}$  mile radius of the well locations. Of the 23 wells, five are active, five are proposed, one is currently being drilled by Denbury, nine are plugged, and three are pending to be plugged. Denbury presented evidence that except for the three pending wells to be plugged, all of the wells within a  $\frac{1}{2}$  mile radius of the well locations are plugged, completed, or will be completed in a manner that protects fresh water strata and will isolate and confine the injected fluids to the unitized interval so there will be no impact on other owners, including the surface owners or their surface rights. Denbury's testimony included the operator's added incentive to properly confine the fluids to the injection interval due to its effect on the efficiency and effectiveness of the operator's  $CO_2$  flood. Regarding the three wells remaining, Denbury agreed to the inclusion of a special condition in the injection permit that provides that prior to injection Denbury must demonstrate to the Commission that these wells are properly plugged and abandoned in accordance with Commission rules.

The Unit is an existing enhanced recovery project in the Oyster Bayou Field, involving injection of both water and CO<sub>2</sub>. CO<sub>2</sub> injection began in June 2010, and CO<sub>2</sub> and water injection continues while the field is presently shut-in to increase the reservoir pressure to near original pressure. This higher pressure will aid the miscibility of the CO<sub>2</sub> to mix with the oil, thereby enhancing production. At the time of the hearing, reservoir pressure was up to 3,655 pounds, and Denbury anticipated beginning production at approximately 3,800 to 4,000 pounds. The company has expended a capital investment for initial development, including construction, drilling, workover and operations, of 122 million dollars, and anticipates the further development of the field to bring the total to approximately 153 million dollars. Denbury anticipates that its flood will result in the additional recovery of approximately 23 million BO, and expects a peak production rate of approximately 5,700 to 6,700 barrels a day. Denbury's testimony is that the injection permit applications were part of the well-pattern testimony at the prior Unit hearing for which Mr. Wells had notice but did not appear. Unnecessary delay in obtaining the permits will prevent economic and efficient management of the reservoir.

The field is fault bounded to the south, east, and west, with only the north side of the reservoir being open to potential migration of hydrocarbons and CO<sub>2</sub>, which is why Denbury plans to install and operate a curtain injection operation on Tract 7 (Mr. Wells' surface), the northernmost portion of the Oyster Bayou Field Unit. The continued injection through well numbers 701, 702, and 703, for which permit applications have been

submitted to the Commission, is designed to prevent the escape from the unit of the hydrocarbons and CO<sub>2</sub>. Denbury testified that if its proposed curtain injection is unsuccessful, and it does not have injection capability in a second line of wells, the loss of approximately three million BO and 100 Bcf of CO<sub>2</sub> could occur. Denbury presented evidence that the 103 and 105 wells (together with two other planned injectors) would act as a "second line of defense" to this migration by extending and reinforcing the water curtain and further preventing loss of CO<sub>2</sub> and hydrocarbons. Denbury will monitor bottomhole pressures in its production pattern, in addition to the ratio of injection to withdrawal of CO<sub>2</sub>, in order to assess whether the curtain injection is operating properly. In the event the information indicates the necessity of converting the 103 and 105 wells to injection, the conversion from a producer to an injector could occur in approximately three days. Denbury is installing lines to the well locations now in order to be prepared for such a conversion.

Notices of the subject applications were published in the *Anahuac Progress*, a newspaper of general circulation in Chambers County, on May 11, 2011. A copy of the applications were mailed on May 24 & 25, 2011 to the Chambers County Clerk's Office. On May 24 & 25, 2011, a copy of the applications were sent to the surface owners of all tracts on which injection wells are proposed and to all operators within ½ mile each of the proposed wells.

Denbury has an active P-5 on file with the Commission, with \$250,000 financial assurance. There are no pending enforcement actions against Denbury Onshore L.L.C.

### Protestant's Evidence

Mr. Wells protests Denbury's possible trespass of fluids onto his "cavern" pore space under his surface. Mr. Wells, with his wife, owns the surface estate and a 1/128th non-participating royalty interest in Tract 7. He does not own any minerals under Tract 7. 100% of the minerals under Tract 7 are owned by the Garth family. Tract 7 is leased and unitized into the Oyster Bayou Unit for secondary recovery of the Unit. Mr. Wells did not sign the ratification of the Unit. There are two conflicting title opinions on the ownership of Mr. Wells' 1/128th non-participating royalty interest. Any payments would remain in suspense until title is resolved. Mr. Wells stated his concerns are that his private property rights are being abused as Denbury will use "his" pore space to their benefit, financially.

Mr. Wells submitted a copy of a Supreme Court amicus brief to the Hearing Examiners that was outside the scope of this hearing. Mr. Wells appeared *pro se*, was not sworn as a witness, and submitted no other exhibits during the hearing. Mr. Wells stated that Denbury's Well No. 105 would be close to the southern lease line of Tract 7 and that he was concerned that the injection of saltwater and CO<sub>2</sub> would migrate over to his Tract 7 and affect his property rights. Protestant had an opportunity to cross examine Denbury's

witnesses and established upon cross-examination that a question exists regarding whether he and his wife own a  $1/128^{th}$  non-participating royalty interest in Tract 7. Mr. Wells also questioned the witnesses as to whether there would ever be production on Tract 7 (none). He established the fact that Denbury has some contractual right to sequester  $CO_2$  within the Oyster Bayou Field Unit subsequent to the economic depletion of the field and expressed concern that it would affect "the cavern" below his property.

Finally, in response to Mr. Wells' cross-examination, Denbury's witness testified that the water for the saltwater injection on Tracts 1 and 7 was not from wells on Mr. Wells' property. Although the possibility existed that the water injected into the 105 well could flow in the direction of Tract 7, it was more likely to migrate updip and travel more toward the producing wells on Tract 1. During questioning, Denbury's land witness explained the delays the protest caused in the permitting process and advised that Mr. Wells had been provided her name and telephone number if he had any questions regarding the Oyster Bayou Unit.

#### **EXAMINERS' OPINION**

The Examiners recommend approval of the application for injection authority for the 103 and 105 wells in the Oyster Bayou Field Unit. The wells will be completed in a manner which will protect usable quality water resources and confine injected fluids to the unitized injection interval, the Oyster Bayou Field Unit. There are 23 wellbores within a ½ mile radius of the wells, 20 of which will not provide a conduit to allow injected fluids to migrate out of the injection interval. The remaining three wells, identified as impending plugging, could provide a conduit if not properly plugged and abandoned; therefore, the issued permits shall contain a special condition specifying that injection in the 103 and/or 105 shall not be permitted until Denbury demonstrates to the Commission that those wells have been properly plugged and abandoned in accordance with Commission standards.

Based on the evidence presented, the examiners are of the opinion that no pollution, waste or harm to correlative rights will occur as a result of the activities of Denbury on Tract 1 in the event the subject wells are converted to injectors, and that the wells are operationally needed for a successful CO<sub>2</sub> flood to enhance recovery of oil and to prevent waste of hydrocarbons. The Examiners offered Mr. Wells the opportunity to withdraw his protest at the conclusion of the hearing, but he declined. The evidence demonstrates that Mr. Wells does not own the minerals beneath any of the tracts within the Oyster Bayou Field Unit, nor any interest at all in Tract 1, where the wells will be located.

Denbury has argued that Mr. Wells has no standing to protest these two applications because he is not an affected person under Statewide Rule 46. Denbury has requested

that the Commission make a finding of fact that Mr. Wells is not an affected person entitled to notice under Rule 46 because he has no surface or mineral ownership interest in Tract 1, on which the wells are located. The examiners overrule Denbury's objection to the Protestant's standing.

Rule 46 does explicitly include as affected persons the surface owners of property on which a well is located and commission-designated operators of wells located within one-half mile of the proposed well. However, this listing of affected persons is not exclusive, and Rule 46 contemplates that other persons may be determined to be affected persons. For purposes of Rule 46, affected person means a person who has suffered or will suffer actual injury or economic damage other than as a member of the general public or as a competitor. In particular, Rule 46(c)(3) allows the Commission or its delegate to determine that another class of persons, "which could include adjacent surface owners," should receive notice of the application. Rule 46(c)(4) also requires that the applicant publish notice of its application in a newspaper of general circulation "[i]n order to give notice to *other* local governments, interested, or *affected persons*." (emphasis added).

Generally, a person's right to appear in a proceeding before an administrative agency should be liberally recognized because an agency should be apprised of diverse viewpoints when determining where the public interest lies and how it should be furthered. *Tex. Indus. Traffic League v. R.R. Comm'n of Tex.*, 628 S.W.2d 187, 196 (Tex. App.—Austin 1982), rev'd on other grounds, 633 S.W.2d 821 (Tex. 1982); *R.R. Comm'n of Tex. v. Ennis Transp. Co., Inc.*, 695 S.W.2d 706, 710 (Tex. App.—Austin 1985, writ ref'd n.r.e.); *Fort Bend County v. Tex. Parks and Wildlife Comm'n*, 818 S.W.2d 898, 899 (Tex. App.—Austin 1991, no writ); *Tex. Rivers Protection Ass'n v. Tex. Natural Resource Conservation Comm'n*, 910 S.W.2d 147, 151 (Tex. App.—Austin 1995, writ denied). To have standing at an administrative agency hearing, a person does not need to show that he will ultimately prevail on the merits, only that he will potentially suffer harm. *United Copper Indus., Inc. v. Grissom*, 17 S.W.3d 797, 803 (Tex. App.—Austin 1995, pet. dism'd); *Collins v. Tex. Natural Resource Conservation Comm'n*, 94 S.W.3d 876, 882 (Tex. App.—Austin 2002, no pet.); *Bosque River Coalition v. Tex. Comm'n on Envtl. Quality*, 347 S.W.3d 366, 376 (Tex. App.—Austin 2011, pet. filed).

Mr. Wells is not the surface owner of the tract on which the wells are located, but he is nonetheless a potentially affected person with standing under Rule 46. While there is no evidence indicating the precise distance between the subject wells and the property line of Tract 7, applicant's exhibit 5 shows that well 105 is in close proximity to Tract 7. Denbury's reservoir engineer testified that it is possible, though not likely, that injected salt water from the 105 well would migrate from beneath Tract 1 to beneath Tract 7. Owning the surface property adjacent to the subject wells, Mr. Wells faces a potential harm that a

member of the general public will not suffer.

The examiners believe that providing injection authority to the 103 and 105 wells provides a necessary "second line of defense" to ensure that hydrocarbons and  $\mathrm{CO}_2$  are not lost by moving out of the Unit, which would cause waste. Instead, the utilization of the subject wells will assist in the recovery of significant additional hydrocarbons from the Oyster Bayou Field Unit that would not otherwise be recovered and, therefore, operate to prevent waste and protect correlative rights.

#### **FINDINGS OF FACT**

- 1. Notice of this hearing was given to all persons entitled to notice at least ten (10) days prior to the hearing. Notice of the application was published in the *Anahuac Progress*, a newspaper of general circulation in Chambers County, on May 11, 2011. Copies of the applications were mailed on May 24 & 25, 2011 to the Chambers County Clerk's Office. On May 24 & 25, 2011, copies of the applications were sent to the surface owners of all tracts on which injection wells are proposed and to all operators within ½ mile of each of the proposed wells.
- 2. The Oyster Bayou Field Unit Well Nos. 103 and 105 are currently permitted wells that are intended to operate as production wells for Denbury's CO<sub>2</sub> flood.
- 3. Providing the authority to convert the wells to injection will provide the operator with necessary additional capabilities in the event Denbury's curtain injection measures on the adjoining tract are insufficient to trap hydrocarbons and CO<sub>2</sub> within the Unit. Other injection wells are currently authorized under Fluid Injection Project No. F-00195 to Inject salt water and CO<sub>2</sub>.
- 4. The Oyster Bayou Field Unit Lease, Well Nos. 103 and 105 will be completed in a manner which will protect usable quality water.
  - a. The Texas Commission on Environmental Quality recommends protection of useable quality water resources to a depth of 350 feet the area of these wells.
  - b. Each well will have approximately 1,200 feet of 10¾" casing cemented to surface.
  - c. Exceptions to Statewide Rule 13(b)(2) were granted by the Houston District Office authorizing the setting of the surface casing more than 200 feet

deeper than the required protection depth by letters dated May 13 & 24, 2011.

- d. Each well will have 7" or 5½" longstring casing set to an average depth of 8,800 feet, with top of cement behind the longstring estimated to reach a depth at 2,000 feet in each well.
- 5. The Oyster Bayou Field Unit Lease, Well Nos. 103 and 105 recommended for approval will have injection fluids confined to the injection interval.
  - a. The top of cement behind the longstrings is estimated to be at a depth of 2,000 feet in each well.
  - b. The proposed disposal interval is the Frio found between 8,300 and 8,450 feet.
  - c. The proposed injection in each well will be through 3½" tubing set on a packer no higher than 100 feet above the injection interval in each well. The tubing size may be decreased to 2½".
- 6. The CO<sub>2</sub> flood project is expected to result in the recovery of approximately 23 million barrels of additional oil from the Oyster Bayou Field Unit.
  - a. Injection of CO<sub>2</sub> commenced in 2010, and the field is currently shut in to raise the pressure of the field to original levels.
  - b. Peak production is expected to be approximately 5,700 barrels per day.
- 7. There is no evidence that use of the proposed injection authority will harm any oil, gas, or geothermal resources.
- 8. The injection authority, if utilized, will result in the recovery of additional hydrocarbons that would otherwise not be recovered; therefore, granting such authority is in the public interest.
- 9. Mr. Wells is a surface owner of Tract 7, a tract that is part of the Oyster Bayou Unit, but a tract where the proposed injection wells are not located.
- 10. Mr. Wells does not own any minerals under Tract 1 or Tract 7.

- 11. Mr. Wells is not the surface owner of the tract (Tract 1) on which the wells are located, but he is nonetheless a potentially affected person with standing under Rule 46. Owning the surface property adjacent to the subject wells, Mr. Wells faces a potential harm or economic damage different than that of members of the general public.
- 12. The Ocie R. Jackson Ranch Trust and the Jackson Family Trust, the owners of the surface and minerals, respectively, of Tract 1, are affected parties and have standing to protest the subject wells. Both parties support Denbury's application.
- 13. Denbury Onshore L.L.C. has an active P-5 on file with the Commission, with \$250,000 financial assurance.

### **CONCLUSIONS OF LAW**

- 1. Proper notice was issued in accordance with the applicable statutory and regulatory requirements.
- 2. All things have occurred to give the Railroad Commission jurisdiction to consider this matter.
- 3. The use or installation of the proposed injection wells is in the public interest as it will likely result in the recovery of additional oil from the Oyster Bayou Field Unit in the Oyster Bayou Field.
- 4. The use or installation of the proposed injection wells will not endanger or injure any oil, gas, or other mineral formation.
- 5. With proper safeguards, as provided by terms and conditions in the attached final order which are incorporated herein by reference, both ground and surface fresh water can be adequately protected from pollution.
- 6. Denbury Onshore L.L.C. has made a satisfactory showing of financial responsibility to the extent required by Section 27.073 of the Texas Water Code.
- 7. Denbury Onshore L.L.C. has met its burden of proof and satisfied the requirements of Chapter 27.051 of the Texas Water Code and the Railroad Commission's Statewide Rule 46.

### **EXAMINERS' RECOMMENDATION**

Based on the above findings of fact and conclusions of law, the examiners recommend that the application for injection authority for the Oyster Bayou Field Unit Well Nos. 103 and 105 be approved as set out in the attached Final Order.

Respectfully submitted,

Andres J. Trevino, P.E.

Technical Examiner

Michael Crnich

**Hearings Examiner** 

Mishael Cinich



